

THE INVENTION CLAIMED IS:

1. An apparatus for detecting substrates,
comprising:

5 a transfer chamber adapted to couple to a plurality
of other chambers, the other chambers including at least one
processing chamber and at least one load lock chamber;

a first group of sensors positioned in the transfer
chamber to indicate that a substrate is disposed for loading
10 into a first one of the other chambers;

a second group of sensors positioned in the transfer
chamber to indicate that a substrate is disposed for loading
into a second one of the other chambers;

wherein:

15 the second one of the other chambers is not
adjacent the first one of other chambers; and

at least one sensor of the first group of
sensors also belongs to the second group of sensors.

20 2. The apparatus of claim 1, wherein each of the
groups of sensors comprises four sensors, each adapted to
detect a respective corner of a rectangular substrate.

25 3. The apparatus of claim 2, wherein the
rectangular substrate is a glass plate.

4. The apparatus of claim 1, wherein the transfer
chamber is adapted to couple to seven other chambers.

30 5. The apparatus of claim 4, wherein a total of
fourteen sensors are disposed in the transfer chamber.

6. The apparatus of claim 1, wherein the first one of the other chambers is separated from the second one of the other chambers by at least two of the other chambers in both directions around a circumference of the transfer chamber.

5

7. The apparatus of claim 1, wherein no more than one sensor of the first group of sensors also belongs to the second group of sensors.

10

8. An apparatus for detecting substrates, comprising:

a transfer chamber adapted to couple to at least one processing chamber and at least one load lock chamber;

15 a first ring of sensors disposed within the transfer chamber at a first radius from a center of the transfer chamber; and

a second ring of sensors disposed within the transfer chamber at a second radius from the center of the transfer chamber;

20

wherein the sensors are positioned and the first radius and the second radius are selected so that a position of a four-sided substrate may be detected in front of an opening of each processing chamber and load lock chamber coupled to the transfer chamber without requiring four separate sensors for
25 each processing chamber and load lock chamber coupled to the transfer chamber.

30

9. The apparatus of claim 8, wherein a total number of sensors in the first ring of sensors is equal to a total number of sensors in the second ring of sensors.

10. The apparatus of claim 9, wherein the first ring of sensors consists of seven sensors and the second ring of sensors consists of seven sensors.

5 11. A method of detecting substrates comprising:
 positioning a first group of sensors in a transfer
chamber to indicate that a substrate is disposed for loading
into a first chamber coupled to the transfer chamber; and
 positioning a second group of sensors in the transfer
10 chamber to indicate that a substrate is disposed for loading
into a second chamber coupled to the transfer chamber;
 wherein:
 the first chamber is not adjacent the second
chamber; and
15 at least one sensor of the first group of
sensors also belongs to the second group of sensors.

12. The method of claim 11, wherein each of the
groups of sensors comprises four sensors, each adapted to
20 detect a respective corner of a rectangular substrate.

13. The method of claim 11, wherein no more than one
sensor of the first group of sensors also belongs to the second
group of sensors.

25 14. A method of detecting substrates, comprising:
 disposing a first ring of sensors within a transfer
chamber at a first radius from a center of the transfer
chamber; and
30 disposing a second ring of sensors within the
transfer chamber at a second radius from the center of the
transfer chamber;

wherein the sensors are positioned and the first radius and the second radius are selected so that a position of a four-sided substrate may be detected in front of an opening of each chamber coupled to the transfer chamber without
5 requiring four separate sensors for each chamber coupled to the transfer chamber.

15. An apparatus for detecting substrates comprising:

10 a transfer chamber adapted to couple to seven other chambers, including a first chamber, a second chamber, a third chamber, a fourth chamber, a fifth chamber, a sixth chamber and a seventh chamber; and

fourteen sensors disposed in the transfer chamber,
15 including a first sensor, a second sensor, a third sensor, a fourth sensor, a fifth sensor, a sixth sensor, a seventh sensor, an eighth sensor, a ninth sensor, a tenth sensor, an eleventh sensor, a twelfth sensor, a thirteenth sensor and a fourteenth sensor;

20 wherein:

the first, second, tenth and thirteenth sensors are positioned to detect whether a substrate is disposed for loading into the first chamber;

the second, third, eleventh and fourteenth
25 sensors are positioned to detect whether a substrate is disposed for loading into the second chamber;

the third, fourth, eighth and twelfth sensors are positioned to detect whether a substrate is disposed for loading into the third chamber;

30 the fourth, fifth, ninth and thirteenth sensors are positioned to detect whether a substrate is disposed for loading into the fourth chamber;

the fifth, sixth, tenth and fourteenth sensors are positioned to detect whether a substrate is disposed for loading into the fifth chamber;

the sixth, seventh, eighth and eleventh sensors are positioned to detect whether a substrate is disposed for loading into the sixth chamber; and

the first, seventh, ninth and twelfth sensors are positioned to detect whether a substrate is disposed for loading into the seventh chamber.

10

16. The apparatus of claim 15, wherein:

the seven other chambers are disposed in the following order proceeding clockwise around the transfer chamber: first chamber, second chamber, third chamber, fourth chamber, fifth chamber, sixth chamber, seventh chamber;

the first through seventh sensors are disposed in the following order proceeding clockwise around the transfer chamber: first sensor, second sensor, third sensor, fourth sensor, fifth sensor, sixth sensor, seventh sensor; and

the eighth through fourteenth sensors are disposed in the following order proceeding clockwise around the transfer chamber: eighth sensor, ninth sensor, tenth sensor, eleventh sensor, twelfth sensor, thirteenth sensor, fourteenth sensor.

17. A method of detecting substrates, comprising:

using a first sensor, a second sensor, a tenth sensor and a thirteenth sensor to detect whether a substrate is disposed for loading into a first chamber;

using the second sensor, a third sensor, an eleventh sensor and a fourteenth sensor to detect whether a substrate is disposed for loading into a second chamber;

using the third sensor, a fourth sensor, an eighth sensor and a twelfth sensor to detect whether a substrate is disposed for loading into a third chamber;

5 using the fourth sensor, a fifth sensor, a ninth sensor and the thirteenth sensor to detect whether a substrate is disposed for loading into a fourth chamber;

using the fifth sensor, a sixth sensor, the tenth sensor and the fourteenth sensor to detect whether a substrate is disposed for loading into a fifth chamber;

10 using the sixth sensor, a seventh sensor, the eighth sensor and the eleventh sensor to detect whether a substrate is disposed for loading into a sixth chamber; and

15 using the first sensor, the seventh sensor, the ninth sensor and the twelfth sensor to detect whether a substrate is disposed for loading into a seventh chamber.